1. SCOPE

2. CONNECTIONS

- 2.1 Input connector
- 2.2 Output connector
- 2.3 Pin assignments

3. ELECTRICAL REQUIREMENTS

3.1 Input

- 3.1.1 Input voltage
- 3.1.2 Input current
- 3.1.3 Input frequency
- 3.1.4 Inrush current
- 3.1.5 Efficiency
- 3.1.6 Power Factor.

3.2 Output

- 3.2.1 Output power
- 3.2.2 Output voltage
- 3.2.3 Output current
- 3.2.4 Output regulation
- 3.2.5 Output ripple and noise voltage
- 3.2.6 Output transient response
- 3.2.7 Output voltage drift
- 3.2.8 Output overshoot
- 3.2.9 Output protection
- 3.2.10 Rise time
- 3.2.11 Turn-on delay
- 3.2.12 Output hold-up time
- 3.2.13 Remote sense
- 3.2.14 Power fail
- 3.2.15 Power good
- 3.2.16 Temperature coefficient

4. ENVIRONMENTAL REQUIREMENTS

- 4.1 Temperature
- 4.2 Altitude
- 4.3 Humidity
- 4.4 Shock and Vibration
- 4.5 Input transient susceptibility
- 4.6 Input harmonic compliance

5. SAFETY REQUIREMENTS

- 5.1 Dielectric withstand voltage
- 5.2 Insulation resistance
- 5.3 Leakage current
- 5.4 Safety spacing
- 5.5 Safety standards

6. RELIABILITY

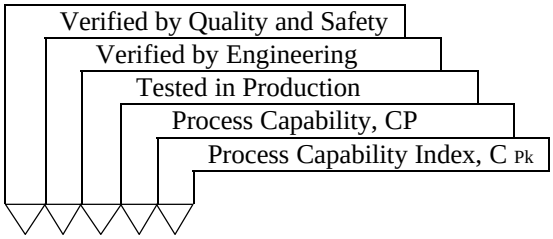
- 6.1 MTBF
- 6.2 FIT

7. EMI REQUIREMENTS

8. APPLICABLE DOCUMENTS

9. MECHANICAL

- 9.1 Weight
  - 9.1.1 Complete Unit
- 9.2 Dimensions
  - 9.2.1 Outline dimension



1. SCOPE

The purpose of this document is to specify the functional requirements of a convection cooled 80Watt continuous output and 130Watt with forced air PSU with dual AC input (110/220 VAC with auto select). The PSU contains one output in an open frame, PCB mount design, with harmonic correction and dual closed loop control. Models covered: VLT130-1001, VLT130-1002, and VLT130-1003.

2. CONNECTIONS

The following will specify the input and output connections provided by the power supply.

2.1 INPUT CONNECTOR

Molex P/N 26-60-4030 (Center pin removed) Mating connector: Molex P/N 09-50-3031

2.2 OUTPUT CONNECTORS

Power connector: Thomas & Betts P/N 2MV-06 Mating connector: wire input, (maximum tightening torque=5 inch lbs.).

PF connector: Molex P/N 22-23-2081 Mating connector: Molex P/N 10-11-2083

2.3 OUTPUT PIN ASSIGNMENTS INCLUDING SENSE

P/N : 2MV-06						
	VLT130-1001	**Pin-outs**	**VLT130-1002**	**Pin-outs**	**VLT130-1003**	**Pin-outs**
V1A	+12V	Pin-5	+15V	Pin-5	+24V	Pin-5
V1B	+12V	Pin-2	+15V	Pin-2	+24V	Pin-2
	COM	Pin-3,4	COM	Pin-3,4	COM	Pin-3,4
	N/C	Pin-1,6	N/C	Pin-1,6	N/C	Pin-1,6
P/N : 22-23-2081						
	N/A	Pins-1,2,3	N/A	Pins-1,2,3	N/A	Pins-1,2,3
	COM	Pin-4	COM	Pin-4	COM	Pin-4
V1A	12Vsns -	Pin-5	15Vsns -	Pin-5	24Vsns -	Pin-5
V1A	12Vsns +	Pin-6	15Vsns +	Pin-6	24Vsns +	Pin-6
V1B	12Vsns -	Pin-8	15Vsns -	Pin-8	24Vsns -	Pin-8
V1B	12Vsns +	Pin-7	15Vsns +	Pin-7	24Vsns +	Pin-7

3. ELECTRICAL REQUIREMENTS

(Unless specified otherwise, all specifications are at nominal input voltage, full load, and 25°C, with PSU in warmed up condition. Unless specified all specs will be within 3% of the stated typical value.)

This section defines the electrical requirements for the power supply unit.

3.1	INPUT The operating conditions for the AC input are described in this section.
3.1.1	INPUT VOLTAGE The operating range is 90-132 VAC/180-264 VAC, single phase. Nominal V_n =115/230.
3.1.2	INPUT CURRENT With an input voltage of 90VAC, at 130W output, the RMS input current shall be less than 3.3A.
3.1.3	INPUT FREQUENCY Input frequency range 47 – 63 Hz.
3.1.4	INRUSH CURRENT Maximum inrush shall be 40A at 264VAC at cold start.
3.1.5	EFFICIENCY The efficiency of the power supply is 86% typical. Measured at 12V @ 10.8A, 15A @ 8.7A, and 24V @ 5.4A with 230 VAC input. Measurement is taken at the PCB connector pads at 25°C ambient after a 5 minute warm up cycle.

Verified by Quality and Safety
Verified by Engineering
Tested in Production
Process Capability, CP
Process Capability Index, C_{Pk}

3.1.6 POWER FACTOR
The minimum PF at Full load, at 230VAC is > 0.95

3.2 OUTPUT
The operating conditions for the DC output are described in this section.

3.2.1 OUTPUT POWER
The power supply will provide a single DC output (two identical output supplies internally configured to share current). The MAX total continuous output power is 80W with free air convection and 130 watts with 15CFM of forced airflow over the unit. See mechanical diagram for airflow requirements.

3.2.2 OUTPUT VOLTAGE
Initial setting tolerance is measured with 50% of load range for free air convection, with line voltage set at nominal. The voltage and initial setting tolerance will be adjustable to +300 mV/-200mV. Measured at connector without sense lines.

Model	**O/P**	
	NOM	**SET TOL.**
VLT130-1001	+12V	± 1 %
VLT130-1002	+15V	± 1 %
VLT130-1003	+24V	± 1 %

3.2.3 OUTPUT CURRENT
Maximum load capacitance will be less than 3000uF.

3.2.3.1 RATED OUTPUT CURRENT
The total output power is 80W max with free air convection, and 130W with 15CFM airflow. Max continuous current rating is listed in the following table.

Model	Min.	Max. Free air /Fan
VLT130-1001	0.5A	6.6A/10.8A
VLT130-1002	0.5A	5.4A/8.7A
VLT130-1003	0.5A	3.3A/5.4A

3.2.3.2 LOAD SHARING/ PARALLEL OPERATION:
N/A

3.2.4 OUTPUT REGULATION

3.2.4.1 LINE REGULATION
Measured by varying the line voltage from 90 – 132VAC/180 - 264VAC, at full load.

TOLERANCE	0.3%

3.2.4.2 LOAD REGULATION
Measured by varying the load current from NOM to MAX and from NOM to MIN load at nominal AC input voltage. This is measured at the output connector after 500 ms settling time, and expressed as percentage of set point voltage. The Max value (worst case) is shown below.

LOAD REGULATION	± 1 %

3.2.4.3 CROSS REGULATION
N/A

Verified by Quality and Safety
Verified by Engineering
Tested in Production
Process Capability, CP
Process Capability Index, C_{Pk}

						3.2.5	OUTPUT RIPPLE AND NOISE VOLTAGE (PARD) The maximum allowable pk-pk PARD ripple and noise, measured at max load while keeping total max o/p power to 100W/130W is shown in the following table. It is measured after a 5-minute warm up with 0.1 C-Cap and 10uf E-Cap/Tant Cap connected at the measurement point. Line voltage is set to MIN 90V and 185V for the test.

RIPPLE Pk-Pk (PARD)	1 %

						3.2.6	OUTPUT TRANSIENT RESPONSE The load current is changed from 50% of load range to 100%, at 0.1A/uSec slew rate, 50% duty cycle, 50/60Hz. The recovery time and is measured with reference to the point when the output voltage is within 1% of the load regulation band. The maximum excursion is measured with reference to the point of stability. These are measured after a 5-minute warm up with 0.1 C-Cap and 47uf E-Cap connected at the measurement point to reflect an actual load setup. Line voltage is set to NOM 115V and 230V for the test.

RECOVERY TIME	<1 ms	**MAXIMUM EXCURSION**	<3%

z

						3.2.7	OUTPUT VOLTAGE DRIFT Long-term output voltage drift over 1000 hours operation is less than 0.5%.
						3.2.8	OUTPUT OVERSHOOT The overshoot voltage is measured as a percentage of the nominal output voltage when PSU is initially powered up. Measured with output load @ 10A with ref. to the load regulation band. Line voltage is set to NOM 115V and 230V for the test.

OVERSHOOT	<3%

						3.2.9	OUTPUT PROTECTION The power supply is provided with protection against any fault condition described below and will self-recover with a maximum restart time of 6 seconds after the fault condition has been removed.
						3.2.9.1	OVERVOLTAGE PROTECTION 12V Output = 15V +/- 1V, 15 Output = 18V +/- 1.2V, and 24V Output = 30V +/- 2V.
						3.2.9.2	OVERLOAD PROTECTION Typically occurs between 160-230W. O/P shuts down and hiccups. The PSU will recover when overload condition is removed
						3.2.9.3	OUTPUT SHORT CIRCUIT The power supply is protected against output short circuit. RMS short circuit shall be less than 0.5 A RMS under all conditions. Output voltage of less than 0.5V constitutes a short.
						3.2.10	RISE TIME The output rise time measured from 10% to 90% is :

RISE TIME	<10 ms

						3.2.11	TURN-ON DELAY The turn-on delay time of the main output after AC power is applied from a cold condition is 3.0 seconds MAX at 115 VAC.
						3.2.12	OUTPUT HOLD-UP TIME The power supply shall maintain voltage/current specifications after any loss of input power for a minimum of 15 milliseconds, measured at nominal AC input voltage (115VAC). Measured at V1 regulation band crossing.

Verified by Quality and Safety
Verified by Engineering
Tested in Production
Process Capability, CP
Process Capability Index, C_{Pk}

						3.2.13	REMOTE SENSE Max. of 400mV compensation for o/p cable drop, at output by direct remote sensing at load end. See sec. 2.3 for remote sense availability. Use of Remote Sense requires 15LFM of airflow.
						3.2.14	POWER FAIL N/A
						3.2.15	POWER GOOD N/A
						3.2.16	TEMPERATURE COEFFICIENT Temperature coefficient over entire operating temperature range of 0ºC to 50ºC after one-hour warm-up is:

COEFFICIENT	<2.4mV/°C

4. ENVIRONMENTAL REQUIREMENTS

						4.1	TEMPERATURE Operating temperature range: 0ºC to 50ºC at the full rated output power. Non-operating temperature range: -40ºC to +85ºC.
						4.2	ALTITUDE Maximum operating altitude: 10,000 feet. Maximum Non-operating altitude: 40,000 feet.
						4.3	HUMIDITY Non-condensing relative humidity range: 5% to 95%.
						4.4	SHOCK AND VIBRATION Operating Shock: Three shocks, 15G peak, 11mS sinusoidal, ±1 mS. Both directions of perpendicular axis. Non-Operating Shock: Three shocks, 50G peak, 11mS sinusoidal, ±1 mS. Both directions of perpendicular axis. Operating and Non-Operating Vibration: 5-9Hz, 0.5" double amplitude, 2G PK, 0.5 oct./min, 2 cycles; 9-500Hz, 4G pk-pk, 0.5 oct./min, 2 cycles.
						4.5	EMI TRANSIENT SUSCEPTIBILITY The unit shall comply to the requirements of IEC 1000-4-2, 1000-4-4 and IEC 1000-4-5.
						4.6	INPUT HARMONIC COMPLIANCE The unit shall comply with IEC 1000-3-2

5. SAFETY REQUIREMENTS

						5.1	DIELECTRIC WITHSTAND VOLTAGE Minimum dielectric withstand voltage between input to output = 4250VDC / 1 minute.
						5.2	INSULATION RESISTANCE Minimum insulation resistance: Input to output - 7 Mohm.
						5.3	LEAKAGE CURRENT Leakage current per IEC 950 shall be 1000uA maximum.
						5.4	SAFETY SPACINGS The PCB spacing will comply with the Safety Standards per 5.5.
						5.5	SAFETY STANDARDS The power supply will meet Class 1, SELV of the following safety agency requirements: IEC 950, EN60950, with the following deviations: VDE. UL 1950 (Recognized Component) C-UL (Canadian Approval by UL)

6. RELIABILITY

						6.1	MTBF (Mean time between failure): MTBF @ 25ºC is more than 150,000 hours. Calculated as per BELLCORE T12-332.
						6.2	FIT (Failure in time): Combined FIT of all critical component @ 25ºC, full load is less than…..

Verified by Quality and Safety
Verified by Engineering
Tested in Production
Process Capability, CP
Process Capability Index, C_{Pk}

7. EMI REQUIREMENTS

The power supply shall comply to the limits CISPR 55022 and CISPR 55014, Level B (at 230 VAC and 115 VAC). FCC 47 CFR Part 15, Level B (115 VAC)

8. APPLICABLE TEST DOCUMENTS

Audit Test Program
Production 1 Test Program
Production 2 Test Program
QC Test Program

9. MECHANICAL

9.1 WEIGHT

9.1.1 Complete PSU: Total weight = 10.5 oz.

9.2 DIMENSIONS

9.2.1 Outline Dimension: External dimensions of the PSU, including any case, heatsink or cord is shown below.